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AQUATIC RESOURCES NEWS
A REGULATORY NEWSLETTER
Headquarters, U.S. Army Corps of Engineers, Regulatory Branch

A Note from Headquarters

This month's aquatic resources newsletter concentrates on the use of Geographic Information Systems (GIS) in the regulatory program evaluation process. It begins with an overview of the new automated information system OMBIL (Operations Management Business Information Link) Regulatory Module (ORM) and the development of a GIS tool to be used in conjunction with ORM. It also describes the use of GIS technology to assist in project evaluation in three Corps districts.

To those not acquainted with GIS technology, this appears to be just one more in a long line of advances that promises to improve the way we analyze and make permit decisions. I hope this newsletter dispels this view. As the three district examples demonstrate, GIS technology will revolutionize the way we conduct regulatory business and manage information. The best way to understand GIS is to imagine a database like RAMS or ORM, but with a detailed map that provides the ability to display specific layers that correspond to the information requested by the user. This allows the comparative analysis of data spatially rather than lines of code in a database. This analysis can be as simple as viewing two or more map layers simultaneously on a screen to an in-depth analysis of the change in flow patterns within a watershed as urbanization occurs.

One of my major goals for the program is to combine GIS with ORM and have it deployed on every Project Manager's desk within 5 years. My plan is to emphasize the GIS tool and incorporate ORM data into the GIS component by taking advantage of the work already done in a number of districts. The GIS working group has made great strides in getting everyone on the same sheet of music with regard to the future of GIS in our Regulatory program. I realize this is an ambitious goal and will take more funds than we currently have on board. That is why I am working with other agencies like EPA and FHWA to apply for grants to modify ORM and conduct pilot watershed studies that will develop the first spatial analytical tools to evaluate indirect and cumulative impacts. The idea is to develop these analytical tools as one button "screening tools" that would allow Project managers to conduct a quick review of applications and determine potential impacts to endangered species, historic properties, regional issues, and the myriad of other factors that we evaluate. I believe GIS has the capability to allow the Corps to make more environmentally sound permit decisions in a shorter time, thus improving productivity and environmental protection.

The next issue will discuss various types of mining (e.g., sand/gravel, mountaintop, peat, phosphate) and how various districts are looking at aquatic resource impacts and compensatory mitigation.

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Distribution of Aquatic Resources News

The *Aquatic Resources News* will be distributed to field staff by e-mail. The Newsletter will also be available on the IWR website within the month at: http://www.iwr.usace.army.mil/iwr/regulatory/regulintro.htm
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A Note from the Editor

This newsletter describes three district approaches for utilizing GIS technology and data to improve regulatory decisions. Each district uses GIS in combination with the Corps regulatory database in a different way. Several districts are using the systems that either the Omaha District or the Fort Worth District developed. The Jacksonville District has developed another system that enables project managers to use GIS data for a variety of purposes in the regulatory permit evaluation process. Their system uses a broad cross section of GIS data that are available on the Internet at the Florida Geographic Data Library, which was developed as part of an interagency effort.

The OMBIL Regulatory Module and Geographic Information Systems: An Overview

David Olson

The OMBIL Regulatory Module (ORM) is the new automated information system for the Corps Regulatory Program. ORM will replace RAMS, RAMSII, and the other automated information systems currently being used by Corps Regulatory offices.

The structure of ORM is based on the Regulatory business process, and will help promote consistency in program implementation and data collection. It will help us to better report on Regulatory Program performance, and the Regulatory Program's value to the Nation in protecting aquatic resources. ORM will also be an essential tool for performance-based budgeting and assessing workload indicators.

ORM will help the Regulatory Program become more efficient, through its ability to interact with other computer applications, such as geographic information systems (GIS), electronic permit applications, and the Internet. It will facilitate the exchange of information between agencies, and links between the Corps and other agencies will help improve communications and coordination practices.

ORM deployment began in Jacksonville District in October 2003, and we are proceeding with deployment and training in the other districts. Deployment is scheduled to continue over the next two years, until all Corps districts have installed and implemented ORM.

What is the Value of GIS to the Regulatory Program?

The Regulatory Program can utilize the many features of GIS to improve efficiency and decision-making. GIS can provide immediate access to map layers and associated data used by project managers. Project managers will no longer have to rely on sharing and retrieving paper maps, and can pull up the maps they need without leaving their desks. They could also use GIS functionalities to create custom maps that show features important for evaluating a particular permit application.

A GIS with comprehensive map layers can also assist in the public interest review for permit evaluation by providing a screening tool to identify resources or areas of concern, such as historic properties, endangered species habitat, essential fish habitat, cultural resources, wildlife refuges, traditional cultural properties, nature reserves, and impaired waters. GIS can also help improve internal coordination, by informing project managers of the locations of federal projects and federal lands.

One of the important functions that a GIS can provide is quality assurance for entering geographic data into an automated information system, such as ORM. For example, by retrieving a digital map and locating the site of a proposed project using the pushpin functionality of a basic GIS, project managers can enter more accurate geospatial data, such as latitude and longitude.

When GIS is coupled with the Regulatory automated information system such as ORM or RAMS, it can enhance permit evaluation, compliance, or enforcement processes by providing maps that show the locations of previous regulatory actions, such as issued permits, jurisdictional determinations, compliance inspections, and enforcement actions. For example, if the site for a permit application also had a jurisdictional determination that was done a couple of years ago, the project manager can identify the file for the jurisdictional determination and use the valid jurisdictional determination for evaluating that permit application. Such a system does not rely on institutional memory to remember previous regulatory actions. Links between ORM and the GIS will help project managers review information relevant to previous and pending regulatory actions, including current and expired permits, current and expired jurisdictional determinations, compensatory mitigation sites, compliance activities, and enforcement actions.

The map layers available in a GIS can also provide site information and assist in desktop reviews for project sites. Examples of GIS map layers that may be useful in desktop reviews include U.S.G.S. topographic quadrangle maps, aerial photographs, National Wetland Inventory maps, local wetland maps, and state or local natural resource maps. GIS map layers are valuable reconnaissance tools, but should be used with caution. The information in these map layers should be critically evaluated and validated in the field if time and resources are available. It is important to remember that 1:24,000 scale U.S.G.S. topographic maps may not show the upper reaches of streams (Leopold 1994). Likewise, the National Wetland Inventory maps do not show all wetlands, especially wetlands smaller than 5 to 3 acres in size (Tiner 1997).

For certain types of resources, such as endangered or threatened species habitat, or historic properties, the regulatory GIS can be configured to ensure confidentiality. For example, a project manager may locate the site of a proposed activity that requires a permit, and the regulatory GIS may alert the project manager that there is a historic property within 500 feet of that proposed project. Specific information concerning that historic property can remain confidential, and the project manager would know that there is a need to coordinate with the SHPO/THPO in accordance with section 106 of the National Historic Preservation Act.

A regulatory GIS may be useful to help identify potential sites for compensatory mitigation projects, and for protecting existing compensatory mitigation sites. If the appropriate GIS map layers are available, the regulatory GIS may be a valuable tool for identifying compensatory mitigation sites that would be most beneficial to the watershed or ecoregion. The regulatory GIS can also be used to monitor and protect existing compensatory mitigation projects. By making it easy for project mangers to identify existing compensatory mitigation sites, the possibility of issuing a permit that might fill a compensatory mitigation site is minimized if not completely eliminated.

For enforcement and compliance activities, a regulatory GIS can be used to identify previously authorized activities, depending on how well the automated information system is populated with historic data.

Cumulative impact assessment is a complex analytic process that can be assisted by a regulatory GIS. A regulatory GIS is a powerful tool for tabulating impacts and mitigation in a watershed or ecoregion, as long as the permit data are associated with the appropriate geographic data. For cumulative impact assessment, the quality of base maps and other data are extremely important, because cumulative impact assessment requires baseline information against which to compare future conditions. To assess whether or not those cumulative impacts are having unacceptable adverse effects on the watershed or ecoregion, a manager needs to determine what effects those authorized activities are having on the watershed or ecoregion. For such determinations, cumulative impact assessment requires data relating to aquatic resource functions, the effects development activities have on those functions, the effectiveness of compensatory mitigation in offsetting authorized impacts to aquatic resource functions, and other data relating to cause-and-effect relationships between permitted activities, ecological resources, and communities. To fully undertake cumulative effects analysis with ORM and the regulatory GIS, it will be necessary to develop analytical tools, such as ecological assessment models and scientific cumulative impact assessment methodologies.

How will GIS be used with ORM?

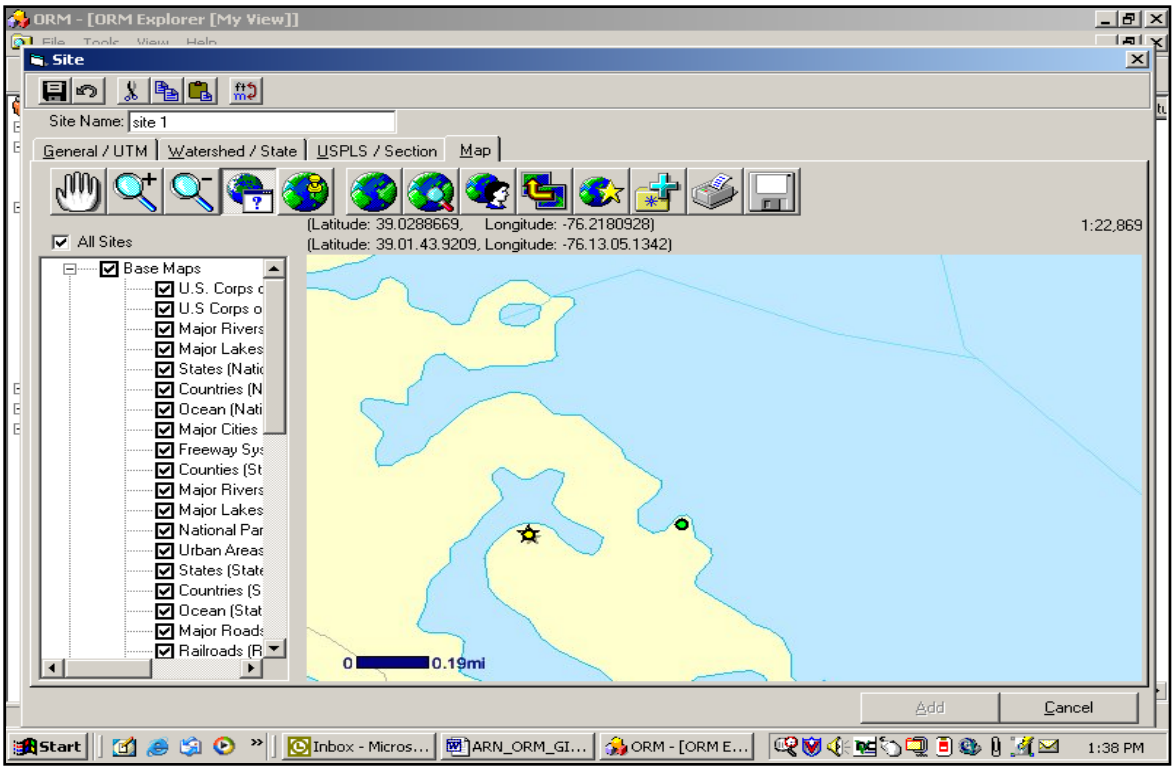
After the decision was made to incorporate GIS capability into ORM, a workgroup consisting of GIS experts and regulatory project managers was established in the fall of 2002. Over the course of several meetings, the GIS component of ORM (gORM) has been further defined and planned by this gORM Workgroup. Some districts want to keep ORM and their GIS as separate applications. In those districts, the GIS would pull data from ORM to produce maps and conduct various analyses. Other districts (e.g. Omaha) want ORM and their GIS to be seamlessly integrated with each other, essentially as a single application in which the data entry and map functions would be accomplished within the same user interface. For those districts that do not currently use GIS, a basic GIS would be added to ORM. To accomplish these different capabilities, the gORM Workgroup identified four levels of GIS functionality for gORM.

Features of Level 1 gORM

Level 1 gORM is a basic GIS system that can be used to populate 14 geographic information fields, by using a push-pin function in the site-descriptor folder of ORM. The Level 1 GIS application in ORM shown in figure 1.

The Level 1 gORM functionality is available at all districts using ORM and it provides project managers with the capability of entering 14 geographic data items into ORM, when the push-pin

Figure 1. An Example Using the Level 1 gORM Interface.



is activated and the appropriate point on the map is selected. Examples of the geographic data that will be populated into ORM with the push-pin include latitude/longitude, the datum, UTM coordinates, watershed name (based on the U.S.G.S. 8-digit hydrologic unit code), county, state, and congressional district.

The basic map layer for the Level 1 gORM is a general map with state, county, city boundaries, as well as the locations of major roads and waterbodies. Level 1 gORM will also provide access to digital raster graphics (i.e., scanned U.S.G.S. topographic quadrangle maps at various scales) and black and white and color infrared digital orthoquadrangles through subscription services.

Features of Level 2 gORM
Level 2 functionality allows districts to do queries to ORM database, to pull data from ORM to populate maps in their district GIS. The maps produced through this capability can be used as screening tools. Level 2 can also provide project managers information concerning previous regulatory actions in the vicinity of a proposed activity. Level 2 also provides districts with the ability to use locally produced GIS map layers with ORM, instead of relying on the map layers available with the Level 1 gORM. In Level 2, it is necessary for users to switch between ORM and the district GIS in the Windows® environment.

Features of Level 3 gORM
Level 3 will provide districts with permission to write directly to ORM to populate certain geographic fields from their local GIS and locally-produced map layers. Districts with Level 3 capability would use their local GIS instead of the Level 1 GIS built into ORM. Districts are responsible for providing the data in a form that can be accepted by the ORM validation process. The validation process is necessary to ensure the integrity of data. Level 3 can support the population of additional data items into ORM, such as river mile, bank, mitigation capacity, gross area type, and public land survey system coordinates. In Level 3, it will also be necessary for users to switch between ORM and the district GIS in the Windows® environment.

Features of Level 4 gORM
Level 4 is still being planned by the gORM Workgroup. It will be an advanced, broad use district-level map-based GIS interface, instead of the form-based interface currently used by ORM. It is anticipated that Levels 1 and 4 will be merged so that the line between the regulatory automated information system interface and the GIS interface will not be noticeable to users. In other words, there will be seamless interaction between the two systems. Level 4 will not require users to switch between ORM and the district GIS in the Windows® environment. We anticipate that Level 4 will provide project managers with map information while working on permit applications. We are also planning to add the capability to support polygons in the Level 4 gORM.

Role of ORM Steering Committee
ORM will evolve as the Regulatory Program changes. ORM will change in accordance with new performance measures, workload indicators, or other reporting requirements that may be adopted in the future. Since ORM is a national database, and will be the same between all Corps district offices, a steering committee consisting of regulatory project managers, program managers, and system administrators has been established. The ORM Steering Committee (ORMSC) will review all requests for modifications and enhancements to ORM. The ORMSC is comprised of individuals from all Corps divisions to provide a national perspective for ORM. We will be inviting suggestions from ORM users to improve the database, and make it more useable by the Regulatory Community. The ORMSC includes individuals with GIS expertise, to provide the ORMSC with understanding as to how ORM will interact with GIS.

Conclusion
ORM is an important tool for the Regulatory Program. It will help us demonstrate the Regulatory Program's value to the nation, by balancing environmental protection with sustainable economic development. ORM will assist in assessing the Regulatory Program's performance, and will be an integral tool for performance-based budgeting. By incorporating GIS into ORM, the Regulatory Program will have more tools to improve the efficiency of permit evaluation and enforcement, and will help improve our decision-making capability.

References
Leopold, L.B. 1994. The View of the River. Harvard University Press (Cambridge, Massachusetts). 298 pp.
Tiner, R. 1997. NWI maps - basic information on the Nation's wetlands. Bioscience. 47:269.

(David Olson is a Biologist/Regulatory Program Manager on the Mississippi Valley Division Regional Integration Team at Corps Headquarters)

Fort Worth District GIS

Steve Swihart and Bryon Haney

Regulatory and GIS go together like peas and carrots. Add a robust database full of site data and spatial layers including USGS Quad Sheets, FEMA flood plains, aerial photographs, NWI maps, River Basins, NRCS soils, Threatened and Endangered species, Cultural Resources; and you have a six-course meal. The analogy is corny, but just about everything in a Regulatory decision is based on the location.

Fort Worth District has been using some form of GIS in conjunction with our Regulatory Program since 1990, and we keep finding more and better uses for it. Our GIS started out as a mapping tool that provided location information to be entered manually into our RAMS database. It has grown into a GIS that is capable of drawing information directly from RAMS to be displayed with the spatial information. It will also collect information from the GIS layers and push the data to the appropriate fields in RAMS.

Five other Districts have adopted our GIS, and modifications have been made to use their local datasets. Our GIS is capable of connecting to RAMS, RAMS II, and we are in the process of connecting it to ORM. Along with the move to ORM, we are rewriting the GIS application to run on ArcGIS, the latest version of ArcView. This allows us to take advantage of several new tools

including, projection on the fly, the ability to connect to data served by others over the Geography network, and analysis capability that is now built into the standard ArcView package.

Our GIS is designed to provide all of the available spatial data to the Regulator in a useable format, without requiring any GIS training. The concept of our GIS utilizes a set of standard views with common layers, which are easy to move around in. Figure 1 shows an example of the Fort Worth District boundaries view. Note that there are a limited number of spatial layers available at this scale to reduce clutter and speed the initial screen load.

Figure 1 also shows the toolbars, which were added for Regulatory, to the standard ArcGIS interface. One toolbar connects to the database, RAMS, RAMS II or ORM, and gives the user the opportunity to "go to" a location such as a County by selecting from a list, or for those who are familiar with the area, to zoom directly to a location by clicking on the map.

When the user "zooms in" to a County, the view changes, more layers are automatically added to the view, and the Regulatory toolbar is activated (Figure 2). The philosophy is that the system knows where to get the datasets, and the user should not be required to decide "what" or "where are" the data layers that are commonly used. The user is free to add their own data layers, or other available system data at any time, to help with Regulatory decisions. At the County level scale, new data layers commonly used are added to the view. These include roads, waterways, USGS 7.5' Quadrangle outlines, and data layers important to the individual District. Tulsa and Rock Island Districts utilize Section Township and Range data. Tulsa District uses a Wild and Scenic Rivers layer that is unique to Oklahoma. The GIS is customizable by each District without requiring additional programming (a simple "copy and paste" operation modifies the ArcView 3x script, and ArcGIS will utilize the Windows registry and administrative settings). Figure 2 shows the layers commonly used in Texas at the county scale.

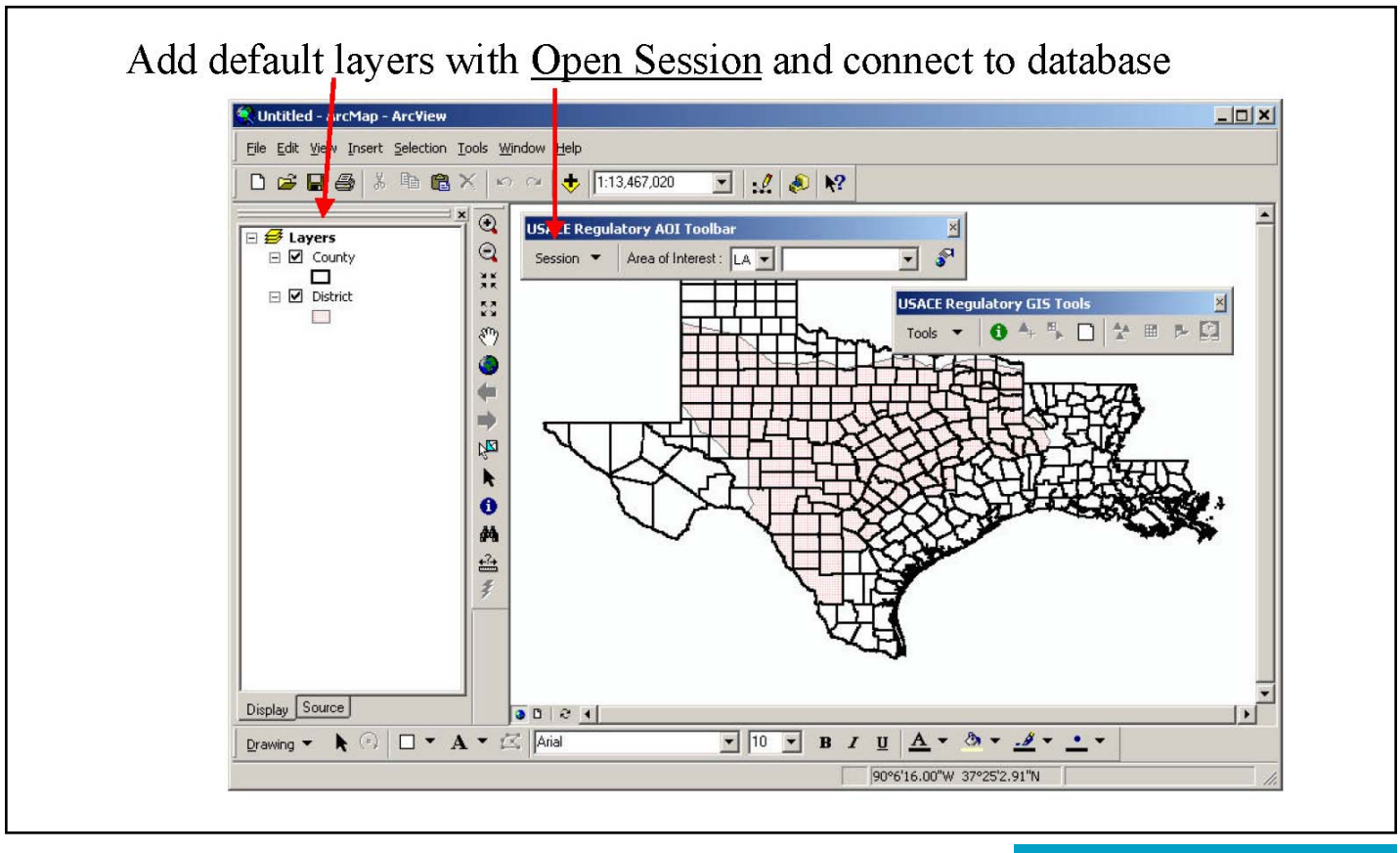
Figure 3 shows the Regulatory toolbar of specialized buttons and dropdown menus to perform specific actions in the GIS.

The main advantages of integrating a GIS with the Regulatory databases is the ability to recall project data on the fly, and to utilize the power of a GIS to assist the user with data entry for spatial location type information. By selecting a tool to add an action, the user clicks the location on a map and the appropriate data is gathered from the GIS layers to be pushed to RAMS, RAMSII, or ORM. The user is presented the data for review and correction before it is sent to the appropriate database. Using the GIS substantially increases the consistency of the data and reduces the time spent gathering data.

Our GIS includes tools to assist in finding a location. There is the ability to search by road or stream name, search on USGS Quadrangle name or search on a specific Section, Township and Range. The results of the last queries zoom the view to the selected records, saving time in locating a project. You could also enter an Action ID, and the GIS will highlight that location.

Documents associated with a project can be viewed directly from the GIS. If you are reviewing a project in a watershed with several other actions in the project vicinity, a mouse click on any of the

Figure 1. Fort Worth District Boundary View



project icons will open a directory where all of the electronic documents for that project are kept. You can select any of the documents, pictures, or even a video clip of the latest field inspection; and the resource will be opened in the appropriate viewer.

The use of a Regulatory GIS provides for a quicker and more accurate method of logging project location information into RAMS, RAMSII and ORM. Cumulative Analysis of impacts at watershed scale is an operation that the GIS can assist with, but is not a built in tool as of yet. For example, the GIS can plot all of the authorized projects in a given area. This provides the Regulatory Project Manager with a spatial representation of the project that they are reviewing, and highlights the possibility of cumulative effects from other projects that were authorized in the sur-

Figure 2. County View.

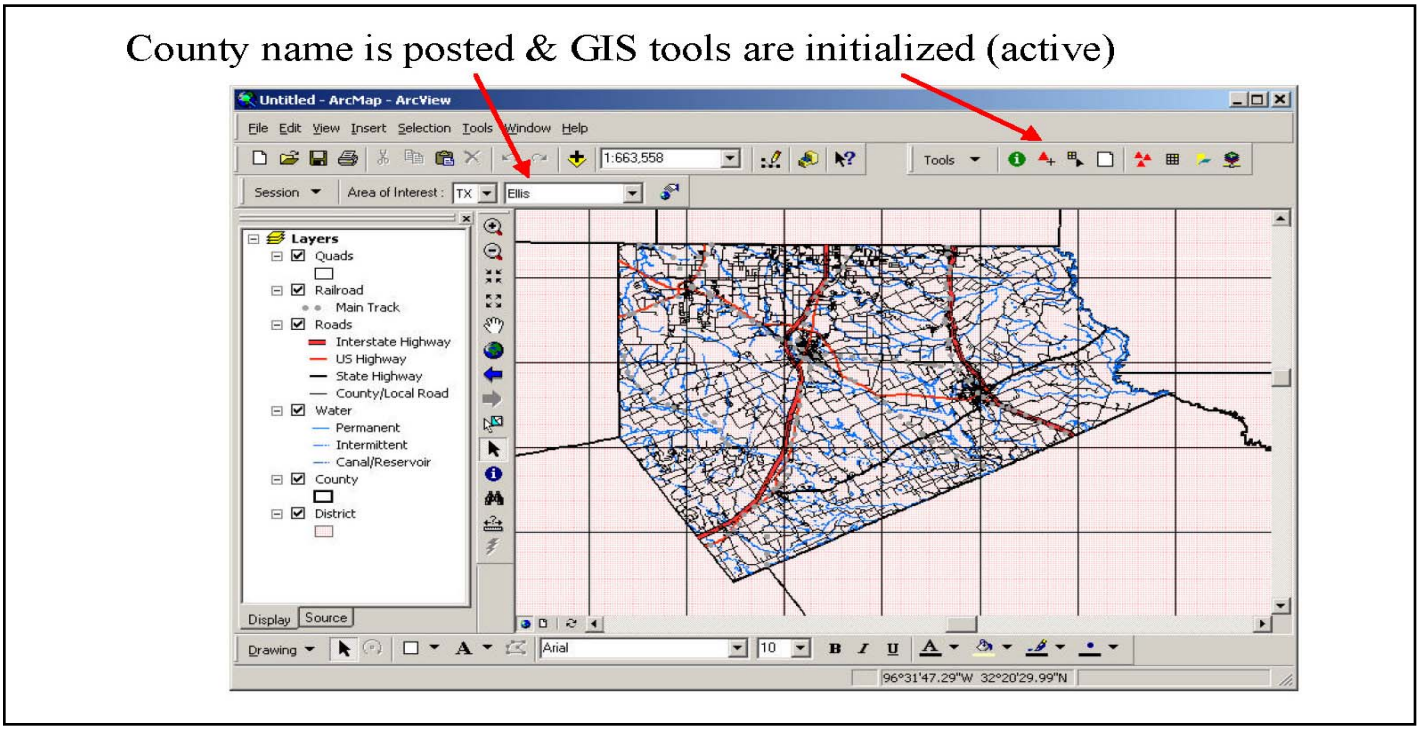
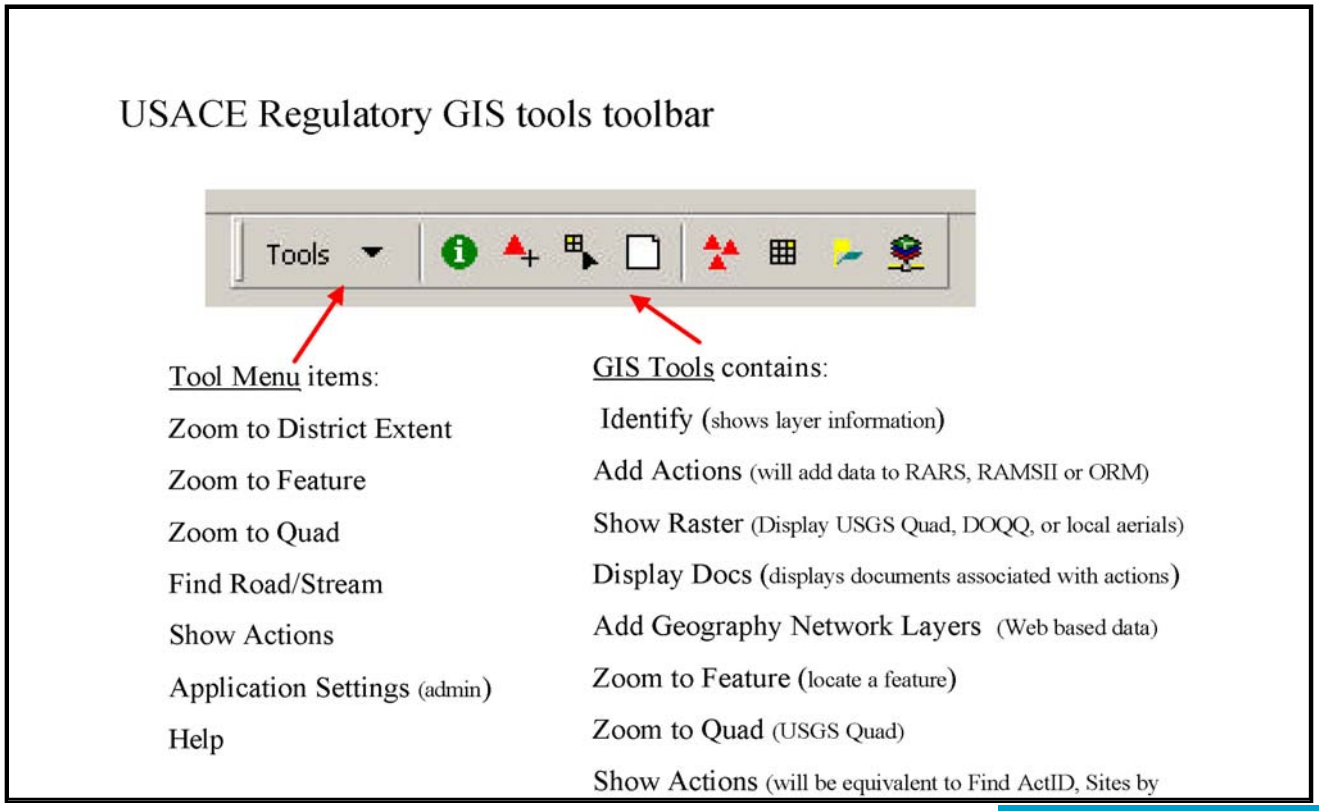


Figure 3. Regulatory Toolbar



rounding watershed. Our GIS includes NWI, USGS Quadrangle, and DOQQ map layers that make it very useful for providing the information required in making an Office Jurisdictional Determination. It is also useful as a first look at alleged violations to determine if the reported activity is a project that we had previously reviewed.

An advantage of this GIS is the ability to adapt to individual District datasets. Where RAMS and RAMSII were used differently and ended up as different datasets in the Districts, this system focuses on allowing the different datasets, but creating the same look and feel to any District using the GIS.

You may have heard that there are multiple levels of Regulatory GIS being introduced in association with the conversion to ORM. The ORM/GIS Workgroup identified 3 levels of activities that needed to be accomplished with ORM. Level one is to develop a basic GIS mapping tool, utilizing National datasets, built inside ORM to allow simple data entry. The Level 1 GIS mapping tool is currently being deployed with ORM. Level 2 is an action, not a GIS. Level 2 opened the entire ORM database to provide read only access to various products, including GIS, running outside of ORM. Level 2 was accomplished in the summer of 2003. Level 3 is to allow the use of a District-developed GIS to add location data to ORM, plus the ability to utilize local data layers to assist in making decisions. Ours is a Level 3 GIS.

We believe that our GIS will continue to grow by sharing costs between the multiple Districts that are using it. We plan on providing additional analytical tools for the Regulatory Project Managers that will help them make informed decisions faster and with less effort.

(Steve Swihart is chief of the Compliance and Enforcement Section in Fort Worth District. Bryon Haney is a physical scientist/GIS in the Planning, Environment and Regulatory Division's Planning Branch Evaluation Section.)

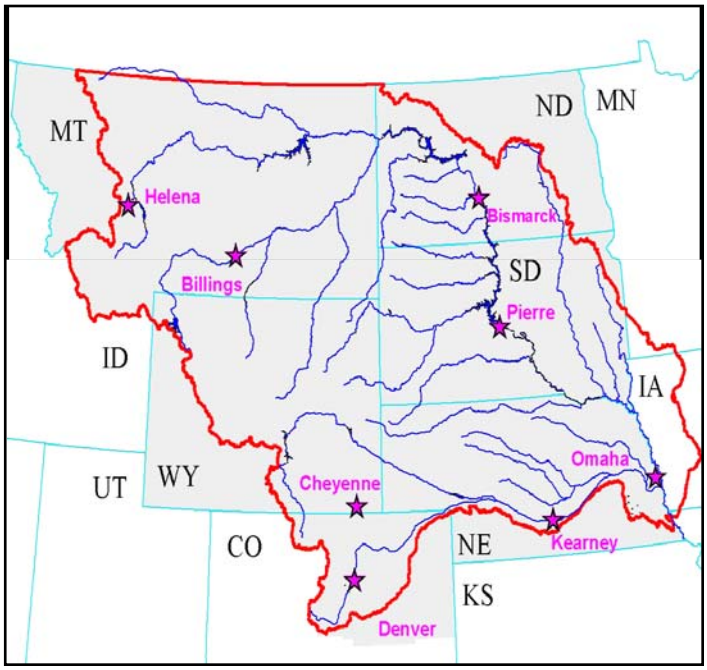
Omaha District GIS

Eric Morrison

The Omaha District is one of the largest Corps of Engineers Districts. Encompassing the Upper Missouri River Basin, the Omaha District covers 6 states and approximately 500,000 square miles. There is one field office in each of the six states with the exception of Montana and Nebraska, which have two field offices each (Figure 1).

In 1993 we began compiling large amounts of Geographic Information System (GIS) data consisting of primarily United States Geological Service (USGS) Digital Raster Graphs, United States Census Data, and National Wetland Inventory (NWI) Maps. We identified the need for a data access method, and at the time the only technology available to us was ArcView 2.x, PC's, Arc Info, and Sun Workstations. A system was developed called Omaha District Information Environment (ODIE) that was predicated on Arc Info Libraries and dependent on an organized data structure. Shortly after this development we noticed that the Corps of Engineers Regulatory Program was in need of a method for inputting location data into its current database. The existing method was to pull a USGS Survey quad sheet, put it on a light table, get out rulers and dot grids, locate the project, and type in a latitude and longitude. This method, termed as "paleo"-GIS by project managers, created a considerable amount of error. The first generation GIS interface was created for the purpose of accurate location data. As program managers became more experienced with the interface and GIS, their needs also expanded.

Figure 1. Gray - Omaha District Regulatory Boundary, Red line - Upper Missouri Basin, Field office represented by pink star.



System Information

Technology has continued to develop over the last 11 years. Not only has ArcView advanced to version 3.3, but there has also been numerous tools and extensions developed in Avenue by the many power users of the Environmental Systems Research Institute (ESRI) Technologies. Computers have more memory and power to handle larger data sets so we are able to interface with higher resolution imagery data sources. The ability to store large datasets has also become possible with data storage becoming more affordable. Our current system consists of personal computers running no less than Pentium 3's with 256 MegaBytes of RAM loaded with ArcView 3.3 single seat licenses. To store and process the data we have two SUN Ultra 60's with up to 1 TerraByte worth of available processing storage space and 1 TerraByte accessible by project managers which we refer to as our corporate data. The corporate data is distributed at all six of our fields sites that are equipped with SUN Ultra 10's serving partial GIS datasets by the state that they service. Each State has approximately 200 GigaBytes worth of GIS data to be used in the Regulatory permitting process.

Brief Description of the GIS interface

The Regulatory permit process involved recording data electroni-

cally for over a decade. Data pertaining to the permit has been stored in an Informix database. Regulatory Analysis Management System (RAMS) was adopted in 1989 for the purpose of inputting permit actions and to track the status of those permit actions. RAMS has assisted the Corps of Engineers in managing changes to the Regulatory program and communication with headquarters or the general public. To connect GIS to the RAMS Informix database we created AV-RAMS, an ArcView GIS interface. The interface started with two basic functions, being able to display all permits that have location information and being able to place a point on a map allowing the correct location information to populate the database. Program managers have requested several upgrades including assistance with printing public notices, the ability to determine area calculations, and retrieving all in depth information about the permit stored in the Informix database just to name a few. The current interface accesses and populates the entire Informix database. This has made data entry more efficient and accurate and allowed us to concentrate on project evaluation and impact analysis.

In Depth Examples

-Red Flags for Permit Review

Utilizing a GIS interface allows us to interact with existing spatial data layers including Archaeology, Endangered Species, Reservation Areas, etc. to assist with the permitting process.

Upon entry of a permit location, the GIS interface will then create e-mails from the project manger to the resource specialist regarding encroachments to existing sensitive areas for that particular "red flagged" permit action (Figure 2). In this fashion the interface is assisting us with coordination with the State Historical Preservation Office, Fish and Wildlife Service, Tribal Entities, and other state or federal offices.

-Context of the Permit Action

With the importance of addressing the cumulative effects of the permit process, GIS has become a valuable tool. GIS allows us to view the permit process on different scales: The State level, the watershed level, and local levels. The GIS interface also assists us with the ability to assess cumulative impacts. The first level of cumulative impacts is being aware of permitting history in the immediate area. Figure 3 shows the different scales and permit history views.

With the GIS interface we are able to display the locations of existing permits and display their Regulatory Action type. We can make a great number of inferences from just knowing the types of regulatory permits. The difference between a Nationwide Permit 35 and an Individual Permit will give the program manger a preliminary picture of the impact to that area.

Given the fact that all the information is geo-located, we are able to see the context of the permit, not only at a small scale, but at a large scale as well. The large scale aspect allows us to view specific projects and evaluate them in the context of the watershed or even the state scales.

The GIS interface provides the ability to concentrate on the impacts of a permit at a given location. (Figure 4) A project manager is able to make a one to one correlation of the impacts to a specific area. The large scale aspect allows us to view specific projects and evaluate them in the context of the watershed or even the state scales.

Figure 2. Notification Screen in ArcView & E-mail Generated to Resource Specialist.

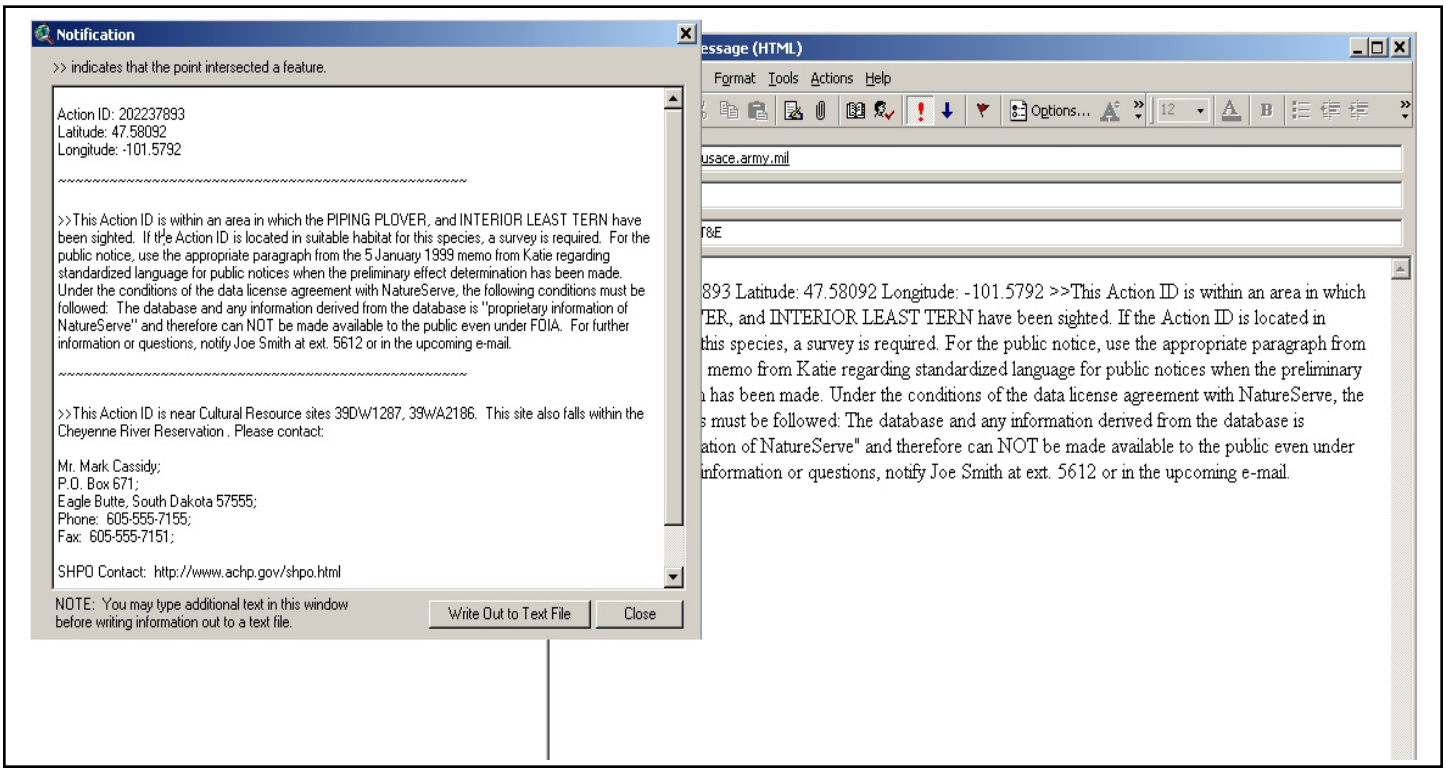
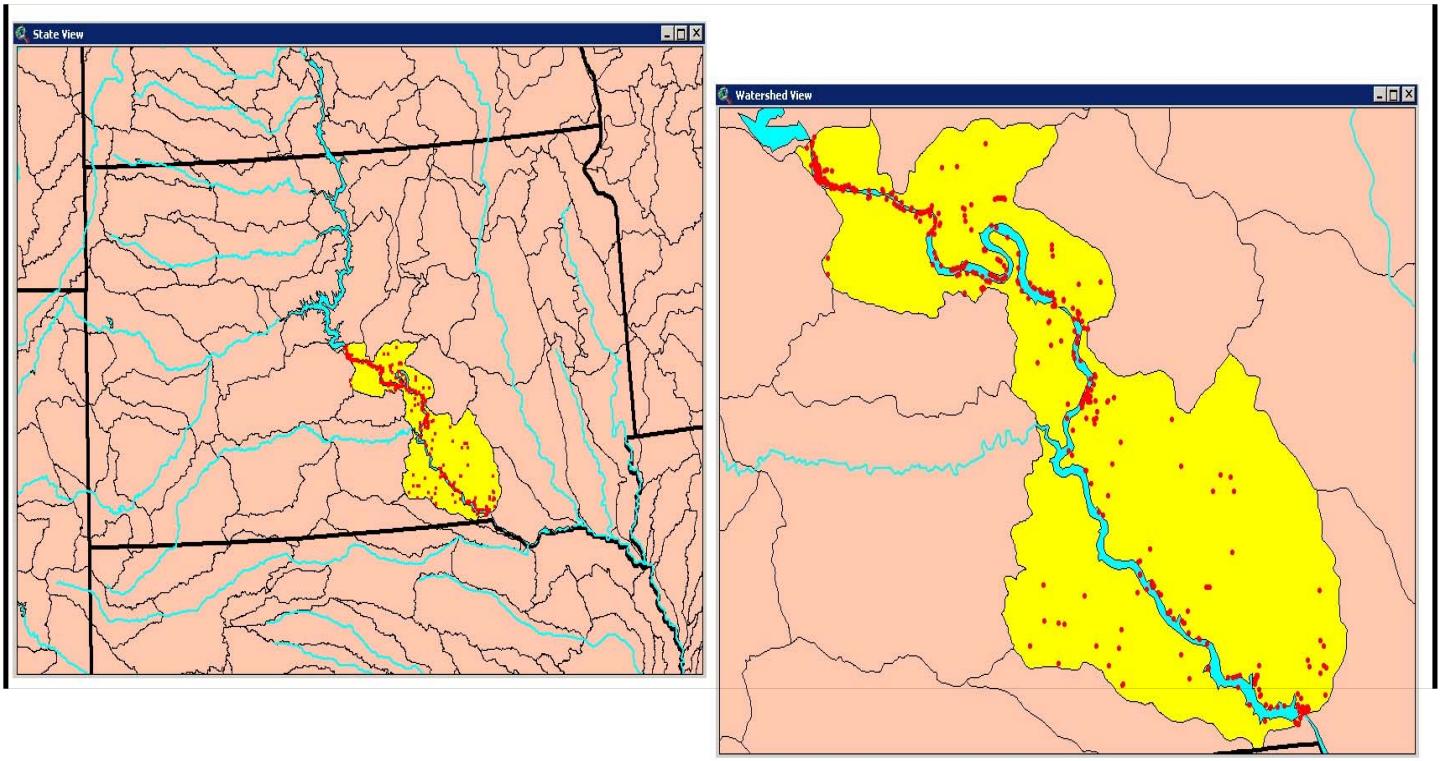


Figure 3. State, Watershed, and Local View of the Permit Action.



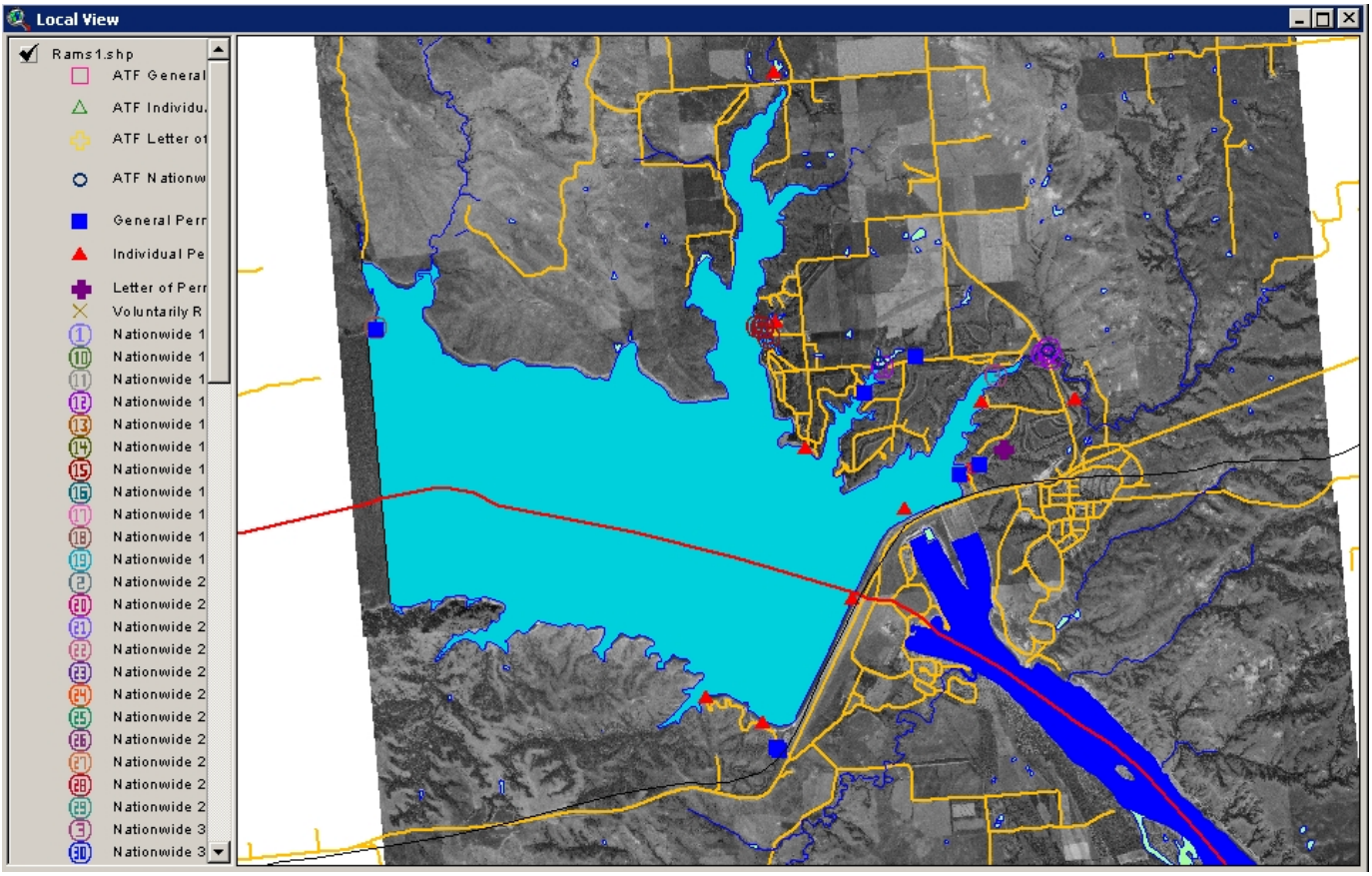
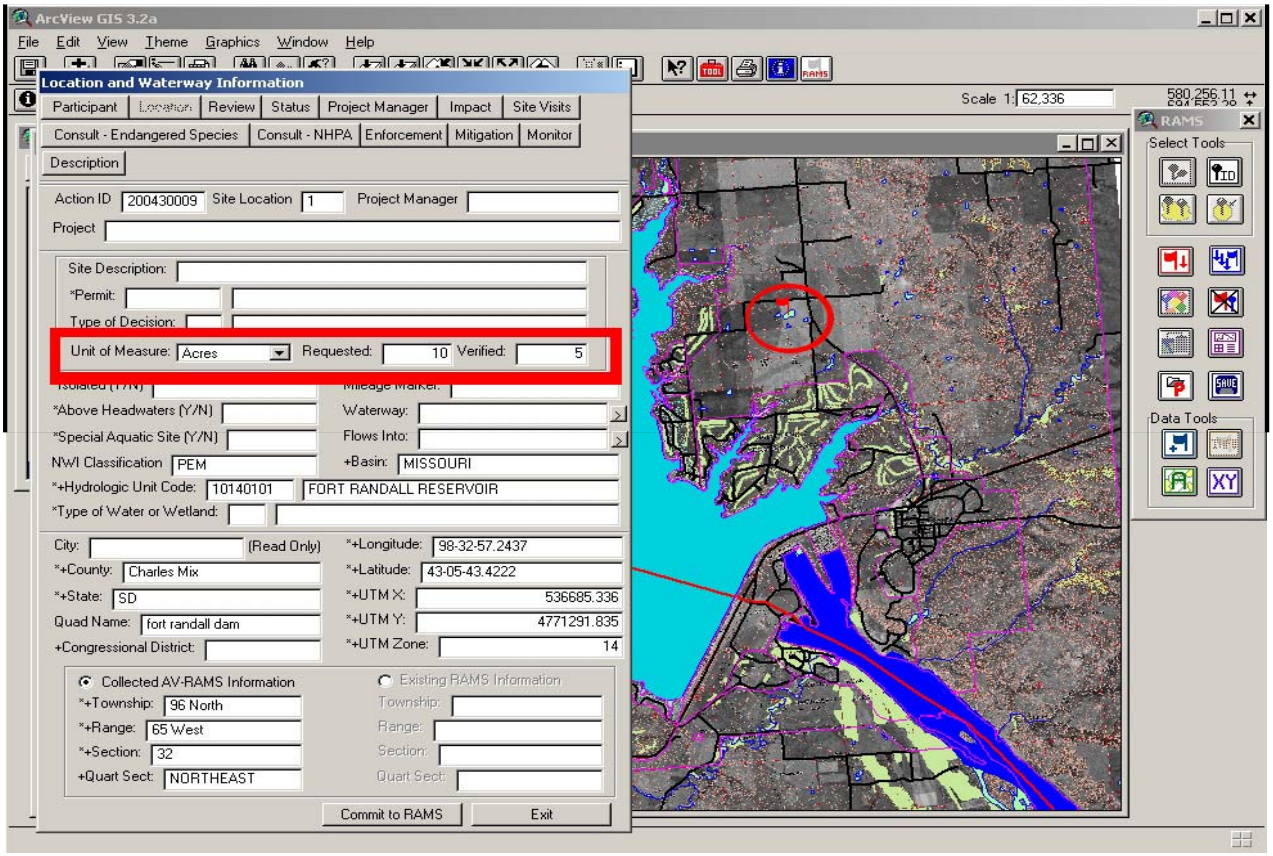


Figure 4. Impacts Associated with Regulatory Action.



Summary - Future of GIS

GIS has become an important tool for the Regulatory Program in the Omaha District. The existing tools and functionality will only improve as technology advances. The Corps of Engineers is also going to a central database OMBIL Regulatory Module (ORM). The ability to connect GIS to ORM is an on-going project. There is currently a committee that is working towards interfacing GIS with the ORM database. The committee has representatives of multiple districts with various backgrounds to provide the necessary user feedback, critical to the development of any applications based information technologies. With the Regulatory Program going to a central database and starting to move towards GIS across the nation, this can provide us with a method to acquire more users. The more users of GIS that exist in the Regulatory Program, the more the tools and functionality of GIS will grow. There are applications and tools out there to be developed that the Omaha District has not even considered yet. GIS will be a valuable asset to the Regulatory Program in the fast approaching future.

(Eric Morrison is a geographer in the Omaha's district Regulatory Branch.)

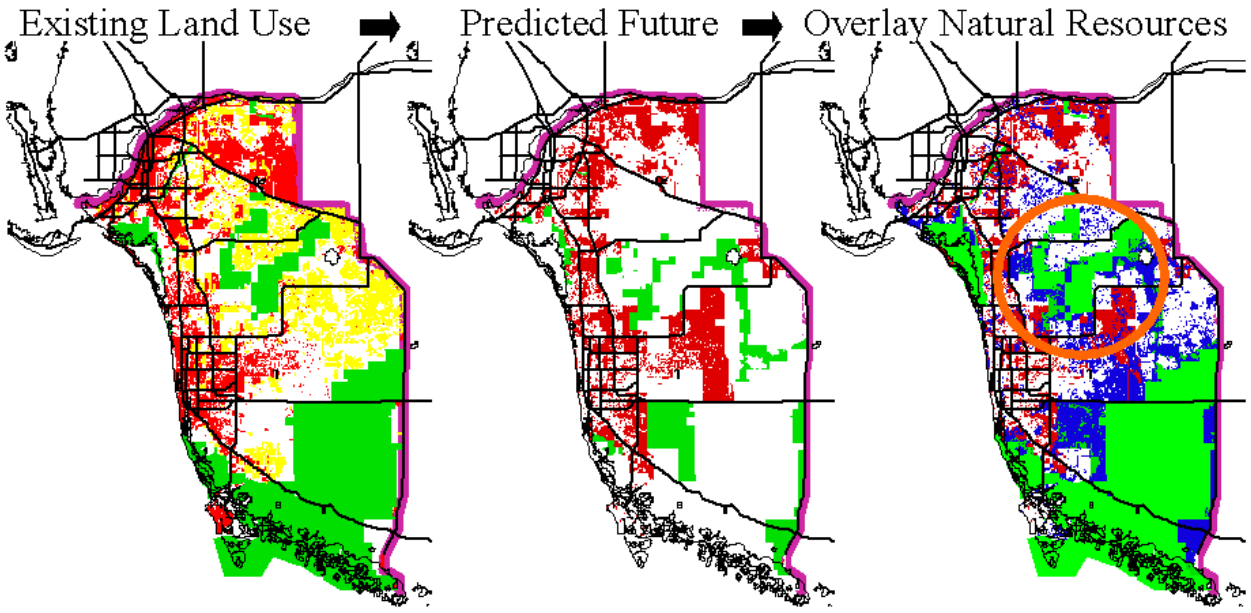
Jacksonville District GIS

Bob Barron

The Regulatory Division of the Jacksonville District has used Geographic Information System (GIS) software in a wide variety of ways.

Getting started. The opportunity to get started with GIS arrived several years ago with a national initiative designed to better coordinate regulatory and non-regulatory activities in the Everglades ecosystem. It provided the impetus for agencies to commit to a dialog and provided a funding avenue through EPA grants. For regulatory, the participants agreed that much time was being lost by their staffs in finding and sharing maps. A team surveyed all the map products that were being used, inventoried which were available electronically, and discussed the degree to which each supported permit reviews. Sub-teams then prepared or modified existing GIS files. For example, the very complex GIS soils maps were processed to simplify the file to just the information most useful. The subteam's purpose was to link GIS technical ability (the software wiz) and the biologist or other subject matter expert who understands the information the map was trying to represent. Approximately 80 Arcview shapefiles resulted from this, ranging from National Wetland Inventory to rainfall data. These as well as other shape files from other projects are now available at http://www.fgdl.org/, the Florida Geographic Data Library.

Figure 1. Series of GIS Overlays for Southwest Florida



Red=housing, Yellow=Agric, Green=Preserves, Blue =Wetland, Orange=Rookery foraging area

A large watershed effort. The early "library" of map products were then used in the preparation of the Southwest Florida Environmental Impact Statement being prepared to improve reviews of permit applications in a very large geographic area (4,030 km2/1,556 mi2) experiencing rapid growth. The GIS maps were to support various evaluations in the EIS. For example, the maps of existing land cover used a large number of classifications that not only introduced the difficulty of matching colors to the legend but also increased the complexity of the discussions. The group wanted a map to display the intensity of human activity and agreed to four subdivisions. Next, maps were produced showing predictions of future development. Then, multiple maps were prepared to describe various natural resource factors. Figure 1 shows these three steps, the third map shows two of the factors deemed important to assess the potential effect on a major Wood stork rookery.

The GIS software was used to generate reports such as acres of development within wetlands. However, a simple report of acres must be combined with non-GIS information for the complete evaluation. For example, two alternatives may have nearly similar areas of total wetland fill but the location of that fill in one will encompass a higher proportion of, say, marsh closer to the Wood stork rookery (more important to the species than one further away during nesting.) Attempts were made to remove some of this subjective portion of the evaluation by adding combinations of GIS report data to arrive at an index that would be based on a GIS analysis, but the number of assumptions and also the quality of the available GIS data made it difficult for the participants to be comfortable with the results.

The EIS produced a set of maps that identify locations where a permit decision may particularly influence a natural resource

Figure 2. Southwest Florida Consultation Areas

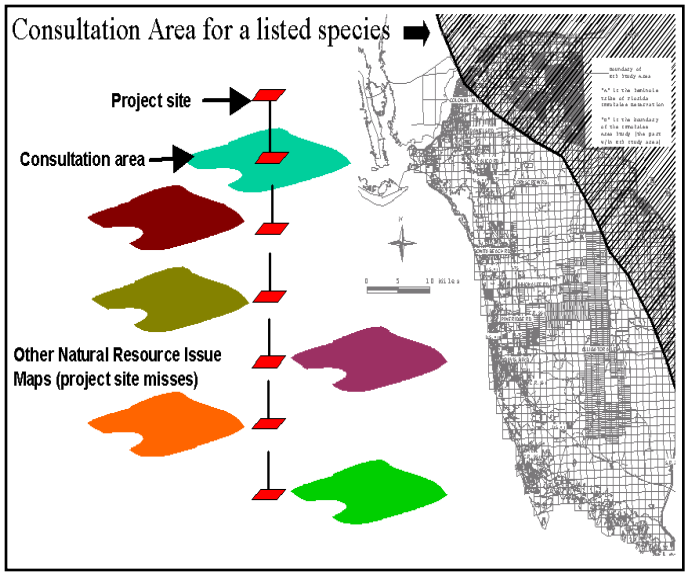


Figure 3. Natural Resource Issue Map

Example of an applicant compared site plan (red & blue) to area mapped to be important for issue (black).

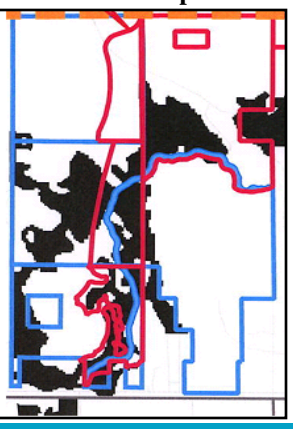
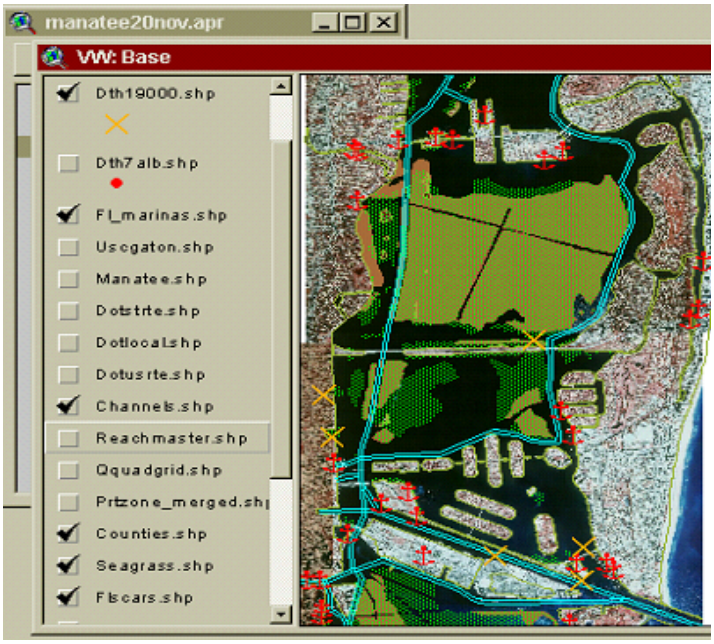
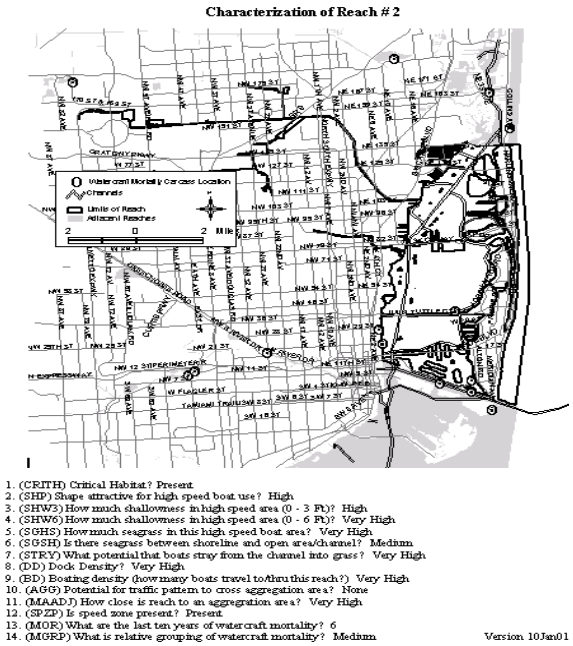


Figure 4. Data Sheets for ESA Consultation Requests





issue. The project manager will screen the location of incoming applications against the maps and accompanying descriptive information to quickly assess whether any issue(s) may be relevant to the application. Figure 2 shows an example with one of maps and figure 3 shows an example where the applicant compares their project site with the EIS maps as part of their alternatives analysis.

Endangered species. The particular map in figure 3 is one that was based on a variety of occurrence data and other information to define a "consultation area." Jacksonville District and the U.S. Fish and Wildlife Service continue to develop and refine more of these. These enable non-specialists to quickly identify when an incoming minor permit action may warrant further assessment. For the Florida manatee, all the waterways in Florida were by divided into parts and various GIS-based information in the library was used to perform an assessment of the potential of manatee/boat interaction. The pre-assembled assessments (called "datasheets") are now attached to the letters requesting formal consultations. This is shown at figure 4.

Screening tool. One product of the interagency coordination effort was a GIS software screening tool. A project manager enters the location of an application and receives what is called a Resources At Risk Report (RAR.) The RAR describes which of the various maps are present at that location (and within a buffer distance that can vary but defaults to 1 mile.) This (and various additional topical reports) can quantify the wetlands nearby, species occurrences, etc. Figure 5 provides screen shots of this tool.

The original software concept was to have the GIS files simplified to the extent that they are suffieciently small so, with the relative ly small Arcview program, that it could stand alone on a field office computer. This caused the headache of updating files and maintaining the custom programming scripts that provided the customized user interface within the program. Jacksonville now has the software and files at a central location and the program is accessed through a web-based program that lets a user run the software from their desk. It is targeted to be updated, migrated or replaced as part of the District's Enterprise Geospatial Information System Project.

The State has converted part of the capability to a web-based tool that is available to the general public. Therefore, for those of you who are thinking of moving to Florida, you can view a limited amount of information and run a RAR report from this web site: http://eraonline.dep.state.fl.us/

The Florida Department of Transportation has also written a web-based application based on the data and the topic reports of this interagency tool to support their Efficient Transportation Decision Making (ETDM) initiative. Here, FDOT contractors will run and post various reports for each of newly proposed road projects, for example, the quantity of wetlands within a buffer distance of the road. Agency representatives, including the Corps, will view the reports and data and submit pre-application comments through the web-based application. Figure 6 provides screen shots of the view, a pre-made topic report, and the form to submit comments.

Regional General Permit. Federal and State agencies have drafted a Regional General Permit (RGP) for another area whose development is just starting. The group used the RAR and topic reports from the interagency tool and processed other information from the "library" to identify areas of higher natural resource value. It is expected that a portion of the study area will be developed but concurrently there will be preservation and restoration of higher valued locations, shown in figure 7. Unlike the above study where there was considerable amount of existing development, here the group could focus on what areas are the most important environmentally (for example, designing corridors) and then leave it to the landowner to design projects within the various environmental restrictions and conditions (and submit for verification under the RGP.)

Figure 5. GIS Screening Tool

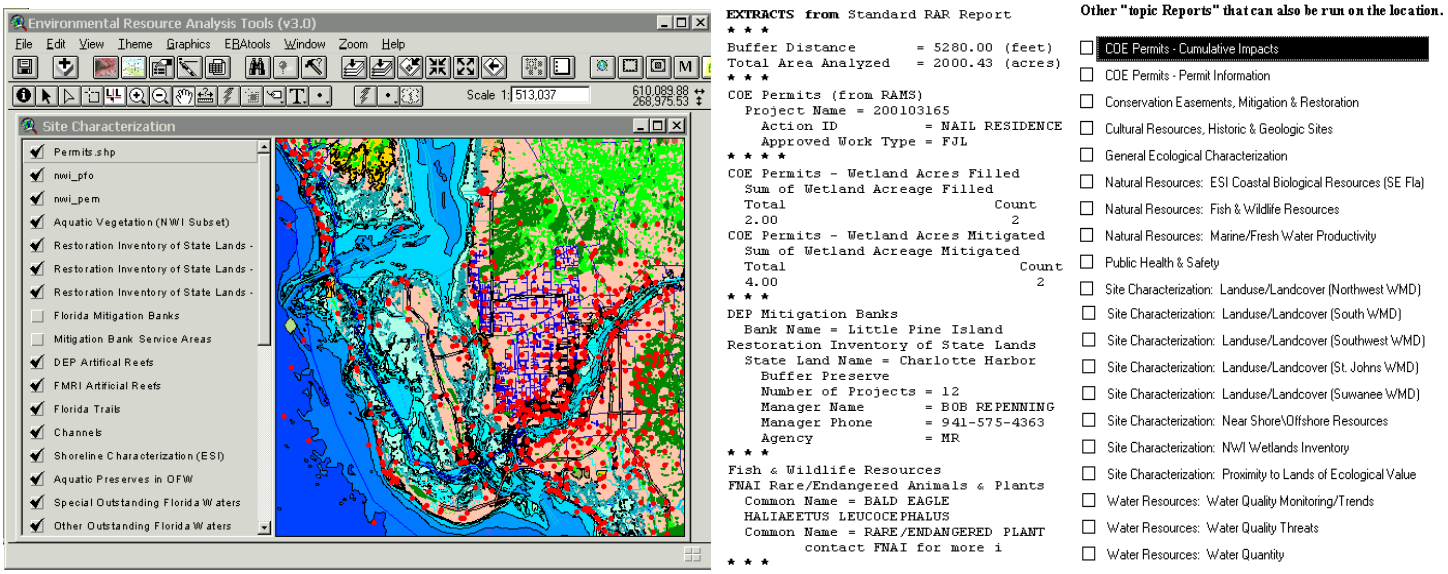


Figure 6. GIS Information and Report

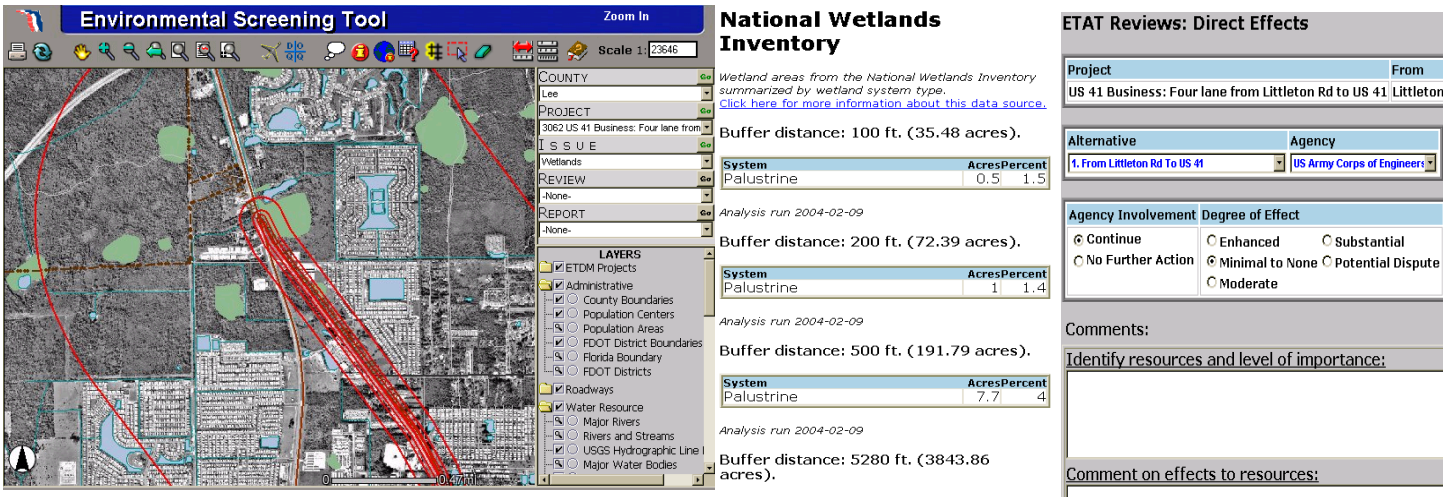
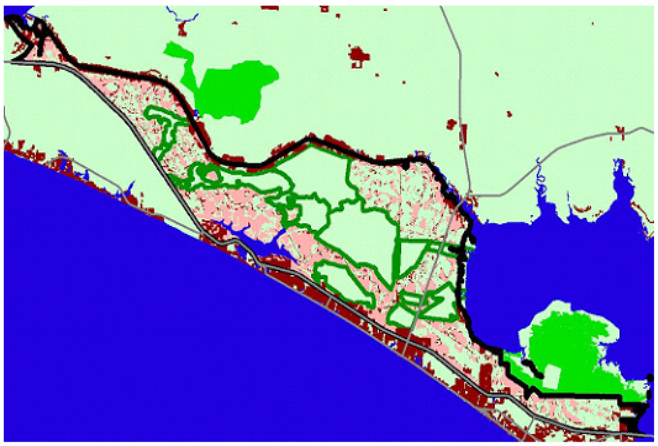


Figure 7. Proposed RGP Preserving Areas of Importance



black = study area/RGP area red=existing development
green = preserved/restored pink = wetland&upland fill

What is next? The efforts described above demonstrate that data alone are not as useful without some additional understanding of the context. For example, species occurrence information alone is not very meaningful unless coupled with understanding of where there are existing or planned actions to preserve habitat connections. The Jacksonville District will continue to utilize GIS by taking opportunities as part of District, national and other initiatives but has also embarked on a watershed intiative to systematize existing information and apply it to daily work. This involves assigning individuals to each of the watersheds as "champions." They are tasked to write a profile for their watershed including descriptions of trends and ecological concerns. This utilizes the expertise and considerable knowledge of our professional staff to identify what is ecologically important in that watershed. Then, each project manager must describe in the decision document how the recommended project by design (avoidance & minimization)

or by compensation affects and addresses individually and cumulatively the ecological concerns in the profile. GIS will provide vital support for all parts of this effort to improve our decisions.

(Bob Barron is a project manager in the Enforcement and Special Projects section in the Jacksonville District Regulatory Division.)

Also of Interest

Changes to HQ. Since the last issue, Celestine Robertson of the HQ Regulatory Branch has retired. She handled the Regulatory Home Page, quarterly permit reports and FOIA requests. Reorganization under 2012 has occurred. Currently, the Regulatory Community of Practice (CoP) consists of Mark Sudol and Kirk Stark, who will cover SAD and POD. Other members of the old Regulatory Branch are assigned as follows: David Olson (CECW-MVD), Jennifer Moyer (CECW-SPD) also covering SWD), Russell Kaiser (CECW-NWD also covering NAD) and Katherine Trott (CECW-LRD). In addition to Regional Integration Team duties, national issues remain with each person. For instance, David will continue to coordinate ORM implementation, Section 106 issues and lead the effort to reauthorize the nationwide permits, Jennifer will keep the White House Energy Task Force and Federal Highways Administration permit streamlining, Russ will continue to be the point of contact for SWANCC issues, windfarms, Interagency Pipeline Task Force and endangered species issues and Katherine will continue to work on surface coal mining, technical wetland issues and regionalization of the 1987 wetland delineation manual. Frank Torbett is now a part of the Resource Management Team. We hope to fill Ted Rugiel's position shortly. *(Katherine Trott)*

Mitgation Action Plan Update. The Federal interagency Mitigation Action Plan (MAP) team is continuing to work on the development of guidance on the use of Off-site and Out-of-Kind Compensatory Mitigation. A notice of availability for this final draft document will be published in the Federal Register in March. Additional guidance on the use of Preservation and Buffers in Compensatory Mitigation and on Difficult to Replace Wetlands are scheduled to be completed this year. Information on the MAP and the status of each action item may be found on the web at www.mitigationactionplan.gov.

Newsletter Communication

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